FACT SHEET FOR PARTNERSHIP FIELD VALIDATION TEST

Midwest Regional Carbon Sequestration Partnership (MRCSP)

NETL Cooperative Agreement DE-FC26-05NT42589

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Submitted by Battelle

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Terrestrial Field Test: Wetlands-Blackwater Refuge		
Principal Investigator	Brian Needelman University of Maryland	bneed@umd.edu
Field Test Information: Field Test Name	Wetlands: Carbon sequestration in restored tidal marshes at Blackwater National Wildlife Refuge.	
Test Location	Cambridge, MD	
Amount and Source of CO_2	Tons: N/A Source: Atmospheric	
Field Test Partners (Primary Sponsors)	Maryland Department of Natural Resources Power Plant Research Program	
	Maryland Energy Administration	

Summary of Field Test Site and Operations:

The Blackwater National Wildlife Refuge is considered a wetland of international importance, has been identified as 1 of 6 priority wetland areas by the North American Waterfowl Management Plan, and is called one of the "Last Great Places" by the The Nature Conservancy. An estimated 8,000 acres of tidal marsh have been lost since the 1930's at Blackwater due to sea-level rise, subsidence, erosion, salt water intrusion, and herbivory by invasive species. Current tidal marsh loss rates are estimated at 150-400 acres per year. The Army Corps of Engineers and the U.S. Fish and Wildlife Service (USFWS) is currently developing a long-term project to use clean dredged material from the Baltimore Harbor shipping channel to restore up to 20,000 acres of tidal marsh at Blackwater and in the surrounding mid-Chesapeake Bay region.

In order to test and develop restoration methods using dredged material, a tidal marsh restoration project was undertaken in 2003. Scientists are currently monitoring these sites for elevation changes and vegetation status. The MRCSP has added data collection on C sequestration in order to use these sites as field validation tests for this technology.

Little is known about carbon sequestration rates in these systems. In natural marshes, high net primary productivity and low decomposition rates lead to high carbon concentrations. If a marsh is able to accrete with sea-level rise, exceptionally high carbon sequestration rates can occur relative to other terrestrial systems. Sequestration rates in restored marshes may be higher than in natural marshes if the ecosystem

follows an increasing trend towards natural marsh carbon densities. However, rates may be lower if the restored marshes do not have the same net primary productivity of natural marshes.

The study is being conducted on one restored tidal marsh cell created in 2003 and one natural marsh cell. Within each cell, 45 plots have been laid out for annual soil core and vegetation data collection. Feldspar markers are being used to mark initial surfaces (pre-accretion), in subsequent years samples will be collected above and below the initial marked surface. Upon collection, soils are divided into horizons, and analyzed for bulk density and carbon. A subset of samples are analyzed for particle size. Equipment at each cell include a recording well, a temperature logger, and redox electrodes. Additional data being collected include porewater chemistry (salinity, nutrients, sulfides, dissolved methane) and methane emissions.

Research Objectives:

- Develop estimates of C sequestration rates in restored marshes across time
- Understand influence of management practices on C sequestration rates in restored marshes
- Improve fundamental understanding of basic processes controlling C sequestration in marsh soil pr
- Develop sampling protocol for C sequestration validation in restored marshes

Summary of Modeling and MMV Efforts: (Use the table provided for MMV)

(TBD)

Accomplishments to Date:

We have established our transects, laid down marker horizons, and conducted our first and second year of sampling and data collection.

Summarize Target Sink Storage Opportunities and Benefits to the Region:

Current proposals include estimates of up to 8,000 hectares of marsh restoration in the mid-Chesapeake Bay region. Modeling work has estimated that the C sequestration rates in these marshes may range from 2.5 to 5.7 Mg C ha^{-1} yr^{-1}. Note that these estimates are approximate and are highly dependent on rates of organic matter accumulation and sea-level rise. At these values the full restoration would sequester 20,000 to 45,600 Mg C yr^{-1} or 75,000 to 170,000 Mg CO_2 yr^{-1}.

Cost*:

Total Project Cost: $23,745,399

DOE Share: $17,458,272 (73.52%)

Non-Doe Share: $6,287,127 (26.48%)

(*) Costs are for overall MRCSP Phase II proje

Field Test Schedule and Milestones:

- **Winter: Re-apply and establish new feldspar marker plots**
- **Spring: Continue methane, porewater, and biogeochemical monitoring**
- **Summer: Conduct third year of sampling**

Fall: Continue methane, porewater, and biogeochemical monitoring